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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/558,588	04/26/2000	Kenji Shibata	3008-03	1056

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EXAMINER

WILLE, DOUGLAS A

ART UNIT PAPER NUMBER

2814

DATE MAILED: 12/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

### Office Action Summary

Application No.

09/558,588

Applicant(s)

SHIBATA ET AL.

Examiner

Douglas A Wille

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 10 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

#### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1–28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano et al. in view of Sasaki et al.
3. With respect to claims 1 and 7, Hatano et al. show a laser (Figure 3 and column 5, line 59 et seq.) with an active layer 45 of  $\text{In}_{0.5}\text{Ga}_{0.5}\text{P}$ , a p-clad layer 46 of  $\text{In}_{0.5}\text{Ga}_{0.2}\text{Al}_{0.3}\text{P}$ , and a p-intermediate layer 47 which is indicated as  $\text{In}_{0.5}\text{Ga}_{0.5}\text{Al}_{0.1}\text{P}$ . Note that the formula of layer 47 is not correct and since the layer is indicated as being low in Al (column 10, line 13) it is therefore interpretable as  $\text{In}_{0.5}\text{Ga}_{0.4}\text{Al}_{0.1}\text{P}$ . Thus layer 47 has a bandgap greater than the active layer and less than the clad layer 46. The layers are also lattice matched. Since Hatano et al. show a laser, there is no window layer but Sasaki et al. show a LED with similar materials (see Figure 3 and column 8, line 14 et seq.) that uses a window layer of GaP. It would have been obvious to modify Hatano et al. with the window layer of Sasaki et al. to provide a LED version of the laser. Note that functional limitations carry no weight in claims drawn to a structure.
4. With respect to claim 2, layer 47 has a wider bandgap than the active layer.
5. With respect to claim 3, layer 47 is p-type.

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6. With respect to claim 5, the layer 47 has the same In concentration as layer 46 and is therefore lattice matched.
7. With respect to claim 6, layers 44, 45 and 47 are InGaAlP, the active layer has Al = 0.0 and has a smaller bandgap than the clad layers. The window layer of Sasaki et al. is GaP and the layer 47 has a smaller bandgap than layer 46 (less Al) and there are p- and n-electrodes.
8. With respect to claim 8, the layers of Hatano et al. and Sasaki et al. show the claimed layers with the claimed bandgap differences (see paragraph 3 above)
9. With respect to claim 9, layer 47 has a larger bandgap than the active layer (more Al).
10. With respect to claim 10, layer 47 is p-type.
11. With respect to claim 12, layer 47 is lattice matched to layer 46 since the In concentration is the same.
12. With respect to claim 13 layer 47 is InGaAlP.
13. With respect to claim 14, the layers of Hatano et al. and Sasaki et al. show the claimed layers with the claimed bandgap differences (see paragraph 3 above)
14. With respect to claim 15, the layers of Hatano et al. and Sasaki et al. show the claimed layers with the claimed bandgap differences (see paragraph 3 above) and Sasaki et al. show the use of Zn in the window layer.
15. With respect to claim 16, Sasaki et al. show the window layer is GaP.
16. With respect to claim 19, the layers of Hatano et al. and Sasaki et al. show the claimed layers with the claimed bandgap differences (see paragraph 3 above).
17. With respect to claim 20 the window layer is GaP.

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18. With respect to claims 4, 11, 18 and 22, Hatano et al. show the doping level of layer 47 is  $1 \times (10)^{18}$  (column 6, line 10). Note also that Sasaki et al. shows the carrier concentration of layers 14, 15 and 17 as being  $5(10)^{17}$ ,  $2(10)^{18}$  and  $2(10)^{18}$  respectively.

19. With respect to claims 17 and 21, Hatano et al. show the dopant is Mg while in Sasaki et al. the p-dopant is Zn. It would have been obvious to substitute Zn for Mg as a design alternative.

20. With respect to claims 23 – 28, the functional limitations carry no weight in claims drawn to a device but note that since the claimed structure is shown, the claimed functions are inherent in the structure.

#### ***Response to Arguments***

1. Applicant's arguments filed 2/3/03 have been fully considered but they are not persuasive.

2. Applicant states that there is no reason to combine Hatano et al. and Sasaki et al. but note that lasers and LEDs have the same layer structures and differ only in the emission mode. Thus all the relative bandgap relationships shown for lasers are also shown for LEDs. LEDs are used for mundane applications such as flashlights and automobile taillights and LED designs would naturally be based on laser designs. Thus there is motivation for using a laser structure for a LED application with proper modifications which would be shown in LED designs. It is therefore obvious to modify a laser design to incorporate change needed for a LED.

3. Applicant states that Hatano et al. show layer 47 as an etch stop layer and do not show the other functions but note that in claims drawn to a structure functional limitations do not carry weight and the structure is shown.

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4. Applicant states that Hatano et al. as modified by Sasaki et al. do not need layer 47 but note that it is not the responsibility of the Examiner to engineer the device and a modification is shown by Sasaki et al. and that is applied to the Hatano et al. device. Applicant also states that there are reasons for not including layer 47 but again that exceeds Examiner's responsibilities.

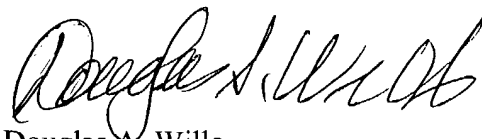
5. Applicant states that Hatano et al. do not use Zn and therefore one would not use Zn in the window layer but note that Sasaki et al. is relied upon to teach the use of a window layer, not its doping.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas A Wille whose telephone number is (703) 308-4949. The examiner can normally be reached on M-F (6:15-2:45).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



Douglas A. Wille  
Primary Examiner